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Stavros Ponis
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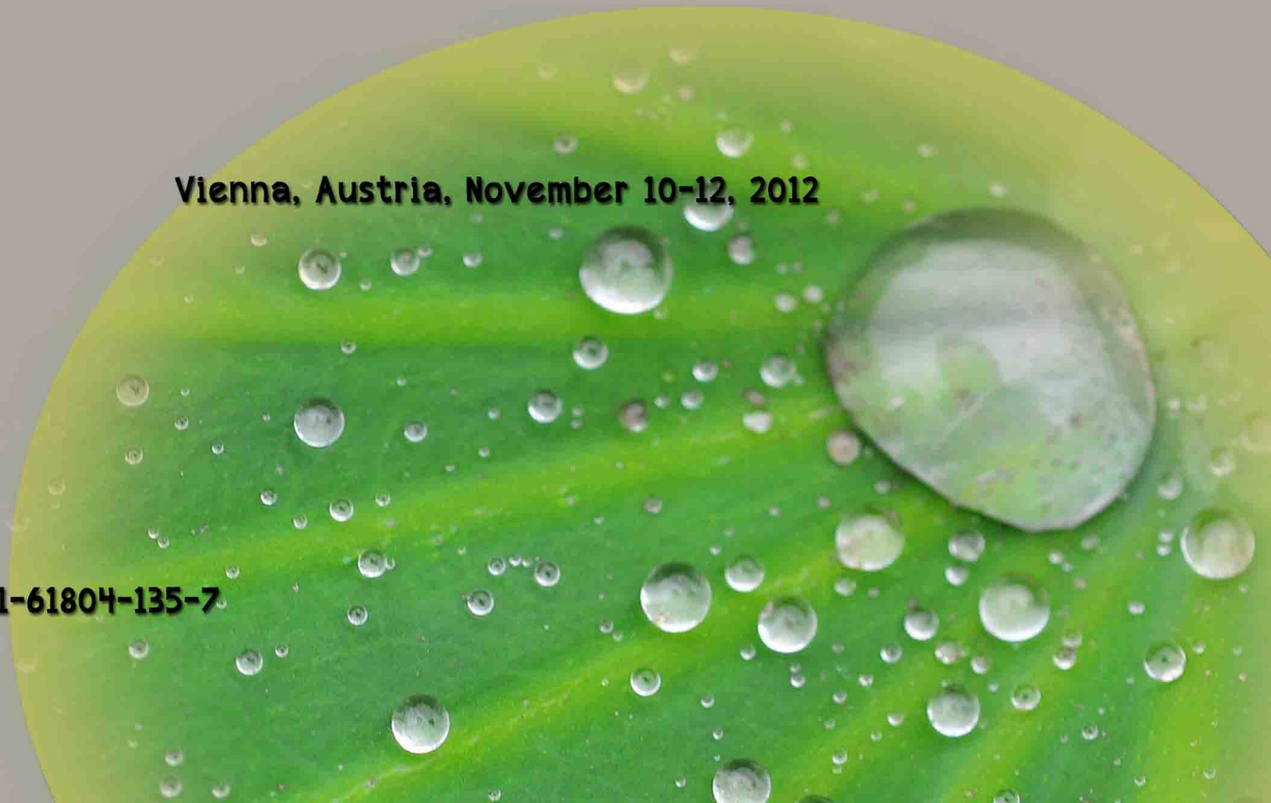
Latest Trends in Environmental & Manufacturing Engineering

- Proceedings of the 5th WSEAS International Conference on Manufacturing Engineering, Quality and Production Systems (MEQAPS '12)
- Proceedings of the 5th WSEAS International Conference on Environmental and Geological Science and Engineering (EG '12)
- Proceedings of the 1st WSEAS International Conference on Natural Resource Management (NRM '12)

Vienna, Austria, November 10-12, 2012



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Alina Adriana Minea
Roman Mihai Daniel
Giri Kattel
Khlif Nadia
Arion Felix

Preface

This year the 5th WSEAS International Conference on Manufacturing Engineering, Quality and Production Systems (MEQAPS '12), the 5th WSEAS International Conference on Environmental and Geological Science and Engineering (EG '12) and the 1st WSEAS International Conference on Natural Resource Management (NRM '12) were held in Vienna, Austria, November 10-12, 2012. The conferences provided a platform to discuss manufacturing systems engineering, complex systems engineering, industrial systems engineering, geology and environmental systems, geophysics, solid waste management, water resources management, wetland creation and restoration, models (hydrologic, hydraulic, water quality), computational hydraulics, educational topics on hydrology, hydraulics, water resources etc. with participants from all over the world, both from academia and from industry.

Their success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of these conferences are published in this Book that will be sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to many Journals for further evaluation.

Conferences such as these can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

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Plenary Lecture 1

Generator Power Transformer Wireless Thermal Management System

Professor Aleksandar Nikolic
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Abstract: Generator power transformer is the largest unit in power plants, since its capacity could goes up to 1400MVA. These transformers are very important for electric power system due to the fact that nowadays it should be wait more than two years for production of new generator transformer. That is reason why it is necessary to continuously supervise transformer operation. Thermal management is one of the essential approaches. Mostly spread method is based on calculating the transformer's highest temperature (i.e. hot-spot temperature) using the measured transformer's top oil temperature and load current. Although power plants are noisy industrial environments, a new solution based on wireless communication is proposed since cabling costs were too high due to complicated installation requirements. This system is used for thermal management of two generator transformers of 100MVA and 210MVA in the power plant and performs all measurements, hot-spot estimations, and transformer cooling system control (oil pumps and fans). Communication between system parts located on and near transformers and power-plant control room is done via Zigbee wireless protocol using real-time application running on Programmable Automation Controller. Because the system is connected via Ethernet to the power plant's LAN, it could be remotely programmed and supervised via the Internet, reducing maintenance time and costs. System is tested during various ambience conditions including high temperatures in the summer (over 40°C) and low temperatures during winter (below 25°C), without any interrupt in its operation. This proves opportunity for industrial wireless networks application in the complex industrial environments like thermal power plants.

Brief Biography of the Speaker: Aleksandar Nikolic received the B.Sc., M.Sc. and Ph.D. degrees in electrical engineering in 1991, 1999 and 2009, respectively, from the Faculty of Electrical Engineering, University of Belgrade, Serbia. Since 1995 he has been with University of Belgrade, Serbia, as a Research Associate at the Department of Electrical Drives, where he is currently part-time Assistant Prof. He is now at Electrical Engineering Institute "Nikola Tesla", Belgrade, Serbia, as a Counselor for the field of energy efficiency. He is also founder and a Head of Accredited Laboratory for Power Quality testing at Institute Nikola Tesla.
His special fields of interest include power quality and energy efficiency, control of induction motor drives and industrial automation. He has published over 70 papers and one chapter in international book "Torque Control". He is reviewer of several international Journals. A.Nikolic is a Senior member of IEEE and a Member of the Board of Serbian Power Electronics Society.

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Plenary Lecture 2

An Empirical Method of Determining Power and Energy Losses in Induction Motors Working in a Factory

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Abstract: The determination of power and energy losses in induction motors implies knowing their electro-mechanic parameters. They can be obtained through measurements. But obtaining them in real situations is very difficult when the induction motors are connected to different working machines in factories, especially when the accessibility to these machines is limited or even impossible. For an efficient power management, in order to meet specialists` needs, when making energy balances, the paper presents a method of determining power and energy losses through calculation, using as a unique piece of information, the rated power of the respective machines. The presentation of the calculation method is accompanied by examples, demonstrating, through the simplicity of calculation and precision of results, its usefulness in making easier specialists` work when realizing energy balances in any manufacturing domain.

Brief Biography of the Speaker: Flavius Dan SURIANU was born in Timisoara, Romania on April, 2, 1949. He received the B.Sc. and the Ph.D. degrees in electric machines from the Politehnica University of Timisoara, in 1972 and 1987, respectively.
His academic career started in the autumn of 1977 at the Politehnica University of Timisoara where he is a professor in areas of Large Industrial Consumer Units, Identification and Mathematical Modelling of Power System Elements and Electromagnetic Compatibility. Since 2001 he is the head of the Power System Department. He has a remarkable scientific and didactic experience being the author of 16 books and of an E-book chapter, 86 papers published in national and international journals and conference proceedings and 66 research projects, mainly in the fields of transient and long term dynamics of power systems, mathematical models of large consumer units, high voltage and electromagnetic risk, electromagnetic compatibility, energy balances and renewable energies. He is a member of IEEE, CIGRE, AGIR (The General Association of the Engineers in Romania) and IRE - EURELECTRIC (The Romanian National Institute for Energy Development Studies).

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Plenary Lecture 3

Investigating Problems of Modeling/Simulating the Behavior of Oil Spills in Marine Environment

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Abstract: Diesel and crude oil spills are common as offshore oil production and transport are continually increasing during the last decades. The significant impacts of these oil spills in the sea are largely mitigated by natural dispersion processes where wave action leads to the formation of micron-sized droplets that are eventually diluted to concentrations below toxic threshold limits. Since the application of dispersants is a common practice for decreasing the hazard for marine ecosystems, the behaviour of the formed solution is of critical importance when the diluted oil spill approaches the shoreline where the behaviour of shallow water mixture (usually in the form of colloid dispersion) is very complicated and sometime unpredictable. Moreover, the interaction of chemical dispersants and suspended sediments with diesel and crude oil influences the fate and transport of oil spills in coasts of touristic importance, with significant economic consequences, especially fro countries heavily depended on such activities. For investigating this behaviour and solving (at least partially) the relevant problems, we have simulated, in laboratory and pilot scale, seawater columns. These columns were used to study the effects of dispersants and other parameters on the formation and sedimentation of oil–dispersant-clay-aggregates in water and seawater (simulated and natural).
In an attempt to contribute in combating oil spill pollution, we have developed new adsorbents, which concentrate and transform liquid oil to the semi solid or solid phase, which can then be removed from the seawater. In general, they can be divided into three basic categories: inorganic mineral, organic synthetic and natural organic products like waste lignocellulosic biomass or agro-industrial by-products. The modification of lignocellulosic waste biomass can provide adsorbents with relatively high sorption capacity, biodegradability and cost-effectiveness for the adsorption of oil products. In our Laboratory we have simulated the modification process of straw and sawdust wastes to obtain low cost adsorbents for cleaning oil-products leakages forming complex solutions/colloids. We have also examined the effect of the modification on their oil spill adsorptivity to find out optimization conditions, according to technical/economic/environmental criteria.

Brief Biography of the Speaker: Assoc. Prof. D. Sidiras holds a 5-year diploma and a PhD in chemical engineering (1990) from the National and Technical University of Athens. He is teaching at the Department of Industrial Management and Technology of the University of Piraeus since 1999. He is teaching at the interdepartmental postgraduate courses (i) Systems of Energy Management and Protection of the Environment, running by the University of Piraeus in cooperation with the Chem. Eng. Dept. of the Nat. Tech. Univ. of Athens, and (ii) Techno-Economic Systems, running by the Electr. & Comp. Eng. Dept. of the Nat. Tech. Univ. of Athens in cooperation with the University of Athens and the University of Piraeus. His research interests include: experimental and computational simulation of industrial/chemical processes; economo-technical analysis of industrial branches/organic chemical industry; renewable energy sources; biomass; natural resources management; GIS based management; environmental management; manufacturing of agricultural product/byproducts; teaching methodology; distance learning.
Assoc. Prof. Sidiras has 17 publications in ISI journals, and 86 in conference proceedings (after peer-review), with 249 citations and an h-index of 9 (source: ISI Web of Science, Thompson Scientific; self-citations excluded). He participates continuously since 1989 in the European Biomass Conferences and published more than 31 papers in their proceedings, while recently he joined the conference's scientific committee.

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Plenary Lecture 4

On the Lifetime of Railway Vehicle Bearing Structures as a Component of Reliability

Professor Ion Copaci
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Abstract: The conference contains the following aspects:
- presentations of the notions of random loads on railway vehicle bearing structures, experimentally established load collective used in the calculation of lifetime, Wohler fatigue diagrams and consecrated degradation theories (Miner, Corten-Dolan, Lehmann, Cioclov etc.)
- during railway vehicle travel there are shock loads that undoubtedly cause a degree of deterioration due to repeated shock loads
- it is important for specialists who study lifetime of structures to analyze the possibility to join the effects of degradation due to the causes: random loads and repeated shock, without offering separate verdicts
The lifetime of a railway vehicle depends on both types of loads and an experimental solution is necessary in order to offer a more adequate degree of security.

Brief Biography of the Speaker: Ion Copaci graduated from the "Traian Vuia" Polytechnic Institute in Timişoara, Romania, Faculty of Mechanics. He received his Ph.D. in the field of Mechanical Engineering with the thesis „Contributions on the Behaviour of the Bearing Structures of Railway Cars During the Longitudinal Shock Caused by Collision", presented at the "Politehnica" University Timişoara, Faculty of Mechanics, Department of Rolling Stock.
Technical Experience: research in the area of vibrations and shocks on railway vehicles (rolling quality, repeated shock), bearing structure resistance (lifetime, fatigue), elastic elements that equip the suspension or shock insulators of railway vehicles, torsional rigidity and travel safety, quantitative determinations (MATHAR) of the internal stresses on the bearing structures of bogies and Francis turbine rotors. Contributions and experimental research for the promotion on the railway of over 150 freight and passenger railway car prototypes, in almost 30 countries on 5 continents, as a result of over 30 years of research.
Nowadays he is a Professor at the Faculty of Engineering of "Aurel Vlaicu" University, Arad, Romania.
Field of specialization: Railway Transport Vehicles, with disciplines taught: "Dynamics of Railway Vehicles" and "Experimental Research on Railway Vehicles". He has published over 120 research papers, 8 books and 4 inventor's licenses.
He is a member of 6 societies and professional associations and he is a member of the Ukrainian Academy of Science.

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Plenary Lecture 5

Strategies Regarding Development of Road Transport to Diminish Fuel Consumptions and Environmental Impacts

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Abstract: This research paper presents an overview of strategies focused on emission controlling related to motor vehicles and road traffic. Transport sector produces a variety of emissions, some of them being a direct greenhouse gas effect (mainly CO_2), others, as, NO_x, VOC, CO, and O_3 having an indirect influence on warming, and particulates (PM). A part of these components have a warming effect, others have a cooling effect that need a careful analysis. As the lifetime of emission components differs, so does their impact on warming and cooling. The greenhouse gas emissions from transport is expected to rise to between 30 and 50%, by 2050 (today it is around 20-25%) and the radiative forcing is expected to increase.
The mobility of tomorrow will be more efficient: environment-friendly, quieter, safer and it will use clean resources. Highly efficient, innovative powertrain technologies and alternative fuels will play a central role in this respect.
Effective road transport scenarios must meet multiple objectives referring to motor vehicle and road traffic, such as:
• Reduction of CO_2 emissions in order to diminish the impact on climate changes;
• Drastic reduction of chemical pollutants and noise emissions;
• Preservation or increase of power train's energetic parameters;
• Providing security of fuel supply;
• Developing an effective sustainable mobility policy.
The options for achieving long-term (2050) CO_2 emission reductions of 65 to 95% in the transport sector are: fuel CO_2 efficiency; vehicle efficiency; driving efficiency; travelled distance.
Reviewing long-term climate targets, passenger cars and light vehicles' emission reduction of up to 95%, the analysis on fuels becomes very prominent. New fuels should be very low-carbon or zero-carbon fuels, meaning that well-to-tank CO_2 emissions are very limited. Thus, a substantial part of the climate mitigation challenge is shifted towards the energy production and refinery sectors.
Some scenarios of long-term development show combinations of vehicle types and fuel types, as:
• BEVs in combination with electricity obtined from (1) fossil fuel with carbon capture and storage (CCS) and (2) biomass, solar, wind, hydro, nuclear and others;
• FCEVs in combination with hydrogen from (1) fossil fuel with CCS and (2) biomass, solar, wind, hydro, nuclear and others;
• ICEV's hybrids in combination with advanced biofuels.
Heavy-duty vehicles can be divided into long-haul trucks, distribution trucks and buses. CO_2 emission reductions of 65 to 95% can be achieved by fuel efficiency; vehicle efficiency, driving efficiency and travelled distance.
The options for medium term (2020) for decreasing of the net greenhouse gas emissions (CO_2) can be obtained by using active technologies determined by the decreasing of fuel consumption or by changing the fuel's nature and characteristcs. Biofuels constitute a central pillar of sustainable mobility. They have the advantage of not requiring essentially new engines or a new infrastructure, since they can be added to fossil fuels in a controlled form. They can be obtained by using alternative fuels. Such alternative fuels can be: methan (NGV); LPG; biofuels as methyl or ethyl esters (biodiesels), biogases (digester gas, wood gas, gas from biomass gasification, ...), alcohols from biomass (methanol, ethanol, ...), vegetable oils, animal fats, etc., or even hydrogen.

Brief Biography of the Speaker: Corneliu Cofaru is a full Professor at the Automotive and Engine Department within the Mechanical Engineering Faculty from Transilvania University of Brasov, Romania. His area of expertise is the environmental aspects of internal combustion engines. He authored or co-authored over 240 scientific papers

published in reviewed journals or presented at international conferences organized by FISITA, EAEC, SIAR, WSEAS etc. He wrote as author and co-author 26 books. Two of these are written in English and are entitled: “Materials-Energy Sustainable Development” published in 2002 and „Transport and Environmental Engineering” published at the Transilvania University Publishing House in 2007. He had the opportunity to manage international projects in Tempus and Leonardo da Vinci frame and he is a member of Romanian society of automotive engineers.

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Plenary Lecture 6

Sustainable Environmental Excellence

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Abstract: Sustainable environmental excellent organizations can operate in different environments, with different stakeholder constituencies, and come in all shapes and sizes but what they do have in common is a mindset based on eight Fundamen¬tal Concepts of Excellence according to EFQM. Each concept is a part of sustainable business. Regardless of sector, size, structure or maturity, organisations need to establish an appropriate environmental management framework to be successful in a sustainable way. The EFQM Excellence Model upgraded to Sustainable Environmental Evcellence Model (SEEM) is a practical, non-prescriptive framework that enables organisations to: assess where they are on the path to sustainable environmental excellence; helping them to understand their key strengths and potential gaps in relation to their stated (Sustainable Environmental) Vision and Mission as well as to integrate existing and planned (sustainable environmental) initiatives, removing duplication and identifying gaps. Sustainable Environmental Excellence Model provides an holistic view of the organisation and it can be used to determine how these different methods fit together and complement each other. The SEE Model can therefore be used in conjunction with any number of these tools, based on the needs and function of the organisation, as an overarching framework for developing sustainable environmental excellence because (sustainable environmental) excellent Organisations achieve and sustain superior levels of performance that meet or exceed the expectations of all their stakeholders (EFQM Excellence Model 2010). Sutainable Environmental Excellence Model and environmental excellence indicators are powerful tools that serve many purposes, useful as tools for sustainable environmental performance evaluation and public information.

Brief Biography of the Speaker: Ddr. Davorin Kralj completed his undergraduate studies at the University of Maribor, Faculty of Chemistry and Chemical Engineering (1987) and post-graduate study at the University of Maribor-Faculty of Organizational Sciences, in the area of Integral Quality Management (1991) and also post-graduate master' study program Management and Organization - MBA at Faculty for Economics and Business in Maribor (2008). In 2009 he holds a Ph.D in the field of Chemistry and Chemical Engineering and in 2012 he holds a second PhD at the Faculty of Economics in Ljubljana. His main teaching and research areas include organizational sciences, environmental management and sustainable development. He has authored or co-authored various scientific papers and environmental patents. He has been awarded numerous certificates and awards. In 2008, have been distinguished with the silver award during the China Association of Inventions and IFIA International Federation of Inventors' Associations, the silver award during the International Jury of IENA 2008 and award of the Best Eco Inventor during the WIPO World Intellectual Property Organization.

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Plenary Lecture 7

Introducing a New Model of Growth: Saferational Development

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Abstract: The aim of this paper is to demonstrate that sustainable development must be redefined considering the present economic crisis and recent evolutions. After numerous philosophical debates, speeches and ambitious commitments about a more sustainable world, we find us today in a rampant unsustainable situation, where the sustainable development definition is only one phrase in fashion, almost empty of meaning that translates into action. Therefore, in order not to be restricted in actions towards a better world, a new model of growth is identified throughout this paper. The novelty of this paper consists in introducing the saferational development and in demonstrating the need of new key components that are essential for a smart development of economies. The saferational development brings along a different system of measurement of a sound economic, social and environmental development, based on two axes: safety and rationality.

Brief Biography of the Speaker: Daniela Cristina MOMETE received B.Sc. (5-years diploma), M.Sc. and Ph.D degrees in chemical engineering in 1996, 1997 and 2005, respectively, from University POLITEHNICA of Bucharest, Romania. From 2000 to 2004 she studied for a second Ph.D degree at the Academy of Economics, International Business and Economics Department, Romania, and graduated in 2004 with a Ph.D. degree in economics. From 1997 to present she has been a faculty member of the Department of Economic Engineering, University POLITEHNICA of Bucharest, Romania, serving as an assistant professor from 1997 to 2002, lecturer from 2002 to 2007, and an associate professor since 2007. She was involved in several education/research fellowships in UK, France and Italy and she is currently developing a post-doctoral research at the National Institute for Economic Research from Romanian Academy, Romania. Her research and teaching interests include energy economics, sustainable development, resources management, economics of the firm, industrial management, European economics and engineering education. She is an author/co-author of several books and more than 50 papers published in international/national journals and conference proceedings. She is a member of Romanian Chemical Society, International Association for Energy Economics (IAEE), Association for Managers and Economic Engineers from Romania and Danube Adria Association for Automation & Manufacturing.

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